L. F. HART.

MECHANISM FOR CUTTING SCREW THREADS.

APPLICATION FILED JAN. 16, 1911.

1,005,966. **Patented Oct. 17, 1911.**

2 SHEETS—SHEET 1.

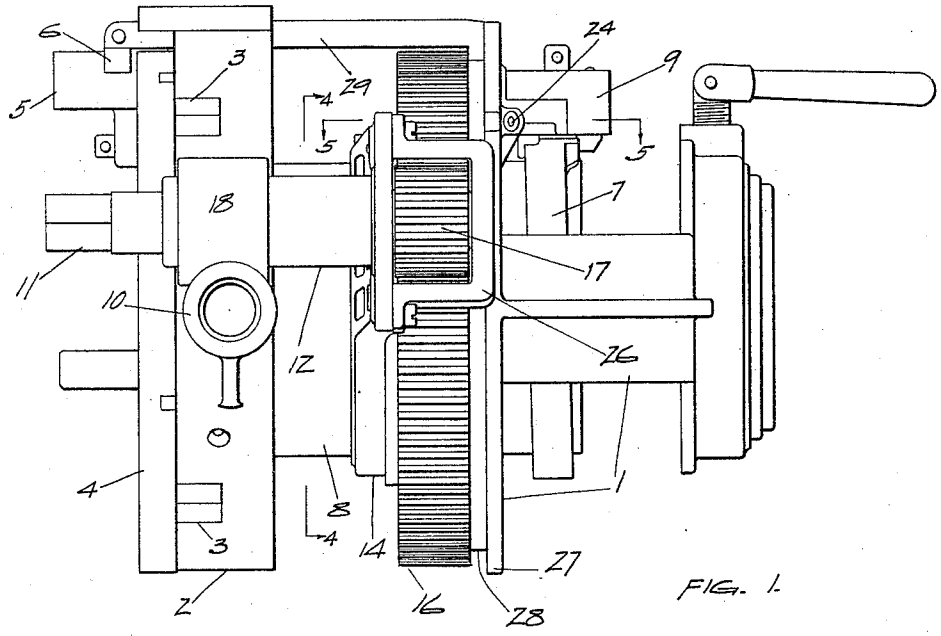

FIG. 1.

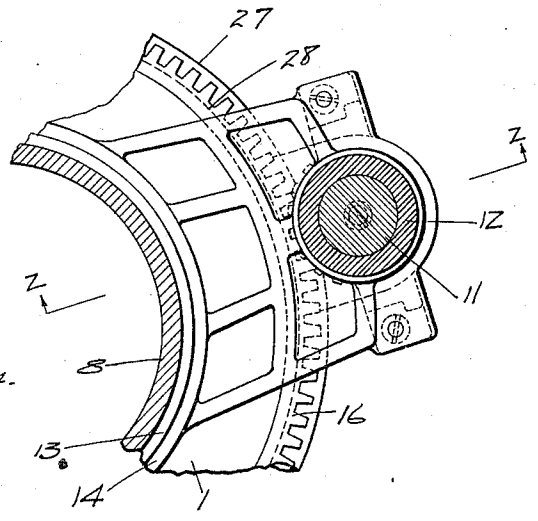

FIG. 4.

WITNESSES:

Jno. T. Shulin

INVENTOR

Louis F. Hart

BY

J. B. Fay

ATTORNEY

L. F. HART.

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2 SHEETS—SHEET 2.

FIG. 2.

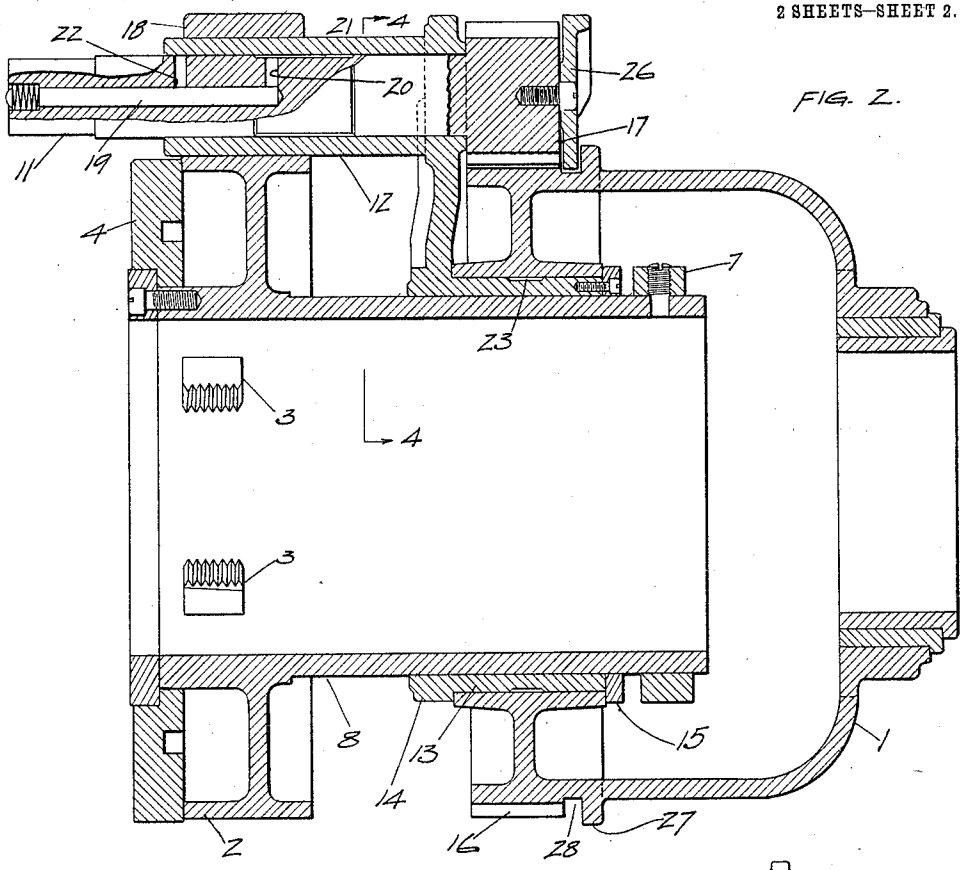
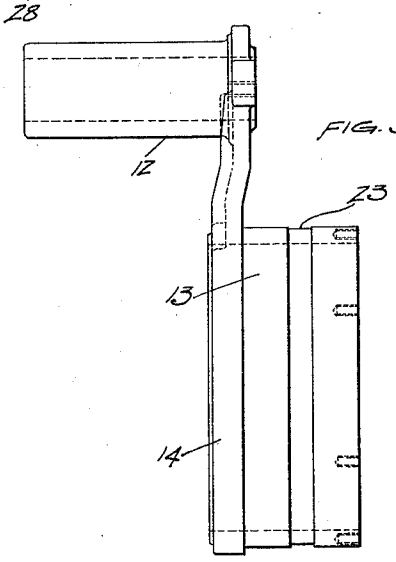


FIG. 3.



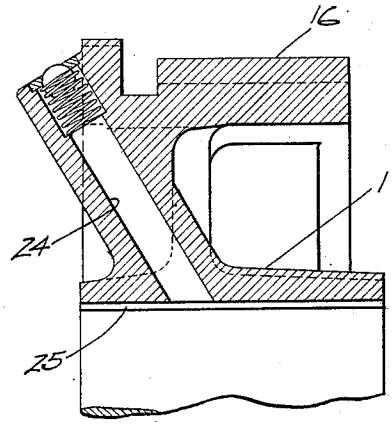


FIG. 5.

WITNESSES:

Jno. T. Sheelin

INVENTOR

Louis F. Hart

BY

J. B. Fay

ATTORNEY

UNITED STATES PATENT OFFICE.

LOUIS F. HART, OF CLEVELAND, OHIO, ASSIGNOR TO THE HART MANUFACTURING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

MECHANISM FOR CUTTING SCREW-THREADS.

1,005,966. Specification of Letters Patent. Patented Oct. 17, 1911.

Application filed January 16, 1911. Serial No. 602,767.

To all whom it may concern:

Be it known that I, LOUIS F. HART, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Mechanism for Cutting Screw-Threads, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

In adapting thread-cutting devices of the general type of construction illustrated in my issued Patent No. 925,181, dated June 15, 1909, for operation by means of a gear drive instead of by handles simply, such adaptation being necessary in the larger sizes of the device, certain difficulties are encountered. These difficulties, moreover, are not confined to such specific type of thread-cutting mechanism, but arise in any such mechanism wherein the die head is both rotatably and longitudinally movable in a holder that is clamped on the work, and that equally whether such combined rotative and longitudinal movements are rendered possible by having the barrel on the head threaded in the holder, or simply loosely mounted therein. In either such construction of the tool, the twisting strain put upon the driving shaft in the head by the long leverage secured through the wrench handle develops a great amount of friction, both in the shaft journal and in the journal-bearing of the head in the holder, as a result of which not infrequently such bearings will bind, and, in any event, operation made much more difficult than should be the case; this difficulty is increased by the dirt that is certain to enter the bearings, where the journals have both a sliding and revolving motion. The conditions just referred to, of course, cause the bearings to wear much more rapidly than they should and so decrease the life of the device.

The present invention has as its object the elimination of the difficulties just referred to, by providing a special mounting for the driving shaft, and, in conjunction with the foregoing, special lubricating facilities are at the same time afforded.

To the accomplishment of the foregoing and related ends said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—Figure 1 is a side elevation of a gear-driven die-stock embodying my present improvements; Fig. 2 is a central longitudinal section of such die-stock; Fig. 3 is a side elevational view of a sleeve which provides the bearing for the driving shaft and constitutes one of the features of the invention; Fig. 4 is a transverse section of a detail taken on the line 4—4 Fig. 1; Fig. 5 is a longitudinal central section of a detail in a plane angularly spaced from the plane of Fig. 2 about the axis of the device.

The general features of construction of the die-stock illustrated in the foregoing figures are substantially the same as in the screw-cutting device which forms the subject matter of the patent above referred to. Thus, as has already been indicated, the die-holding member, or head 1, is both revolubly and longitudinally movable in the work-holding frame 2. The dies 3 in said die-holding member are positioned by a cam-plate 4, which is in turn actuated by inter-engaging elements 5 and 6 to automatically retract the dies during the cutting operation so as to produce a tapered thread, such as is desirable in threading pipes and the like, where it is necessary to secure a tight-fitting joint. Means, consisting of a ring 7 on the barrel-portion 8 of the head and a block 9 on the frame 2 with faces engaging such ring, are also provided for detachably securing the two parts of the mechanism in proper position for starting and for imparting to the head an initial, longitudinal movement upon its being rotated from such starting position, whereby the dies are "led" onto the work. Sockets 10 are furthermore provided, one on each side of the head for the reception of suitable handles (not shown), in case it should be desired to directly rotate the head, as in cutting off pipe, or on like occasions, where

the draft is not too great to permit this mode of operation. For the regular operation of the tool, however, such operation, involving as will be obvious from the foregoing description, the rotating of the die-head within the work-holding frame, the gear mechanism of present interest is provided. Such mechanism comprises in the first place a driving shaft 11, which is rotatably held in a tubular arm, or extension 12, carried by a sleeve 13, eccentrically like a crank, which sleeve is interposed between the barrel 8 of the die-head and the bearing in the work-holding frame 1. Sleeve 13 is secured against longitudinal movement relatively to the frame by means of a flange 14 on its front edge and a retaining ring 15 attached to its rear edge, but is obviously free to rotate within said frame, which is peripherally formed with a spur gear 16 designed to be engaged by a pinion 17 on the inner end of the shaft. Rotation of said shaft accordingly results in a progressive movement, or travel, of the pinion around the gear and thus around the frame, the movement being an epicycloidal one, as will be readily understood. Inasmuch as the result of rotation of the die-heal is to advance the latter longitudinally within the frame by reason of the dies' advance onto the work, there will be a longitudinal movement between the sleeve and the barrel of the head, but no rotative movement. Similarly there will be a relative longitudinal movement between the tubular extension 12 of said sleeve and the bearing 18 provided therefor in the head, but no rotative movement in such bearing, rotative movement at this point being confined to the shaft in said extension. Conversely, the shaft has no longitudinal movement in its bearing; in other words, the result of the foregoing construction is to eliminate all journals having a combined longitudinal and rotative movement and confine such movements to independent journals. The rotative journals, of course, are the ones which are subjected to the heaviest strain and hence sustain the greatest wear, the relative longitudinal movements of the separate parts being so slow as to be almost imperceptible. By the segregation of such rotative journals, however, it is possible to maintain under cover, or wholly inclose the same, despite the rotative and longitudinal movements just referred to, as also to provide for their adequate lubrication. This lubrication in the case of the shaft 11, I obtain by providing a central lubricant-containing passage or chamber 19 in said shaft, extending from its forward end to a point well within its bearing in the tubular sleeve-arm. Such shaft is trimmed down intermediately between its ends, so as to have in effect, two separate bearings within said arm; and leading from the inner end of the longitudinal passage 19 is a radial passage 20 communicating with the annular space 21 thus left between the spindle and the bearing. Inasmuch as in its normal position when not in use, the die-stock rests on the rear end of the frame 2 with the axis vertical, the lubricant in the chamber formed by the central longitudinal passage will fill the space in question and thence pass onto the bearing adjacent to the pinion; while a second radial passage 22 leads directly to the bearing adjacent to the forward end of the shaft.

For lubricating the rotative bearing between the frame 1 and the sleeve 13, an annular recess 23 is formed in the outer surface of the latter to which lubricant is supplied from a chamber 24 provided in the body of the frame and readily accessible from the rear as shown in Figs. 1 and 5. A longitudinally extending groove 25 on the inner face of the bearing in the frame serves to properly distribute the lubricant. The bearing between the sleeve and barrel of the die head, as also between the latter and the tubular arm wherein is journaled the pinion, may be directly supplied with such lubricant as is necessary but the amount thereof will not be great.

It has not been thought necessary to illustrate the handle, ratchet wrench, or other equivalent member that will be used in rotating the driving shaft 11, inasmuch as devices of this sort are of familiar construction, but it will be noted that the forward projecting end of said spindle is squared to receive such operating member. It should further be noted that the pinion 17 is housed in a casing 26 which thoroughly protects it from being brought into damaging contact with external objects while a flange 27 is provided on the frame 1 to similarly protect the gear 16. At the same time said flange, by being spaced from the gear, forms a groove 28 for the reception of the inner end of the rider bar 29 which carries one of the engaging elements designed to control the position of the cam-plate on the die-head.

Actual test has demonstrated the superior operative results obtained by a disposition of bearings such as characterizes the hereinbefore described die stock. In other words, it has been found that despite the severest usage, and under the heaviest operating strain, the bearings do not become overheated or bound, so that the tool may be operated at all times with comparative ease and without waste of energy in overcoming unnecessary friction resistance. This may be attributed in part to the adequate bearing surface allowed the several journals by my improved construction; as also, in part, to the fact that with the segregation of the rotation and sliding movements of said

journals, it becomes practically impossible for dirt to gain entrance into the bearings for the revolving journals.

It may be explained, in conclusion, that while the work-holding frame is shown as designed to be clamped onto the pipe, or other work, (the latter being of course gripped in a vise or equivalent holder) and not otherwise supported, said frame may be thus supported if so desired, thus eliminating the vise entirely. The term, work-holding member, as herein employed, is intended to connote either such structure.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In mechanism of the character described, the combination with a work-holding member and a die-holding member longitudinally slidable and rotatably movable therein; of a third member rotatable, but longitudinally fixed, relatively to said work-holding member and non-rotatable, but longitudinally movable, relatively to said die-holding member; a driving shaft journaled in said third member; a gear fixed on said work-holding member; and a pinion on said shaft meshing with said gear.

2. In mechanism of the character described, the combination of a work-holding member; a sleeve rotatable, but not longitudinally movable, within said member; a die-holding member longitudinally movable within said sleeve but not rotatable relatively thereto; and a driving shaft carried by said sleeve and geared to said work-holding member.

3. In mechanism of the character described, the combination of a work-holding member; a sleeve having a rotatable bearing within said member but held against longitudinal movement relatively thereto; a die-holding member having a longitudinal sliding bearing within said sleeve; an eccentric extension carried by said sleeve and having a longitudinal sliding bearing in said die-holding member; and a shaft journaled in said extension; a gear fixed on said work-holding member; and a pinion on said shaft meshing with said gear.

4. In mechanism of the character described, the combination with a work-holding member and a die-holding member longitudinally and rotatably movable relatively to each other; of a third member longitudinally fixed relatively to said work-holding member, said third member being formed with an eccentric extension longitudinally slidably held in said die-holding member; and a shaft journaled in said extension and geared to said work-holding member, said shaft being of reduced diameter intermediately between its ends and having a passage for lubricant extending from one end to such reduced portion.

5. In mechanism of the character described, the combination with a work-holding member and a die-holding member longitudinally and rotatably movable relatively to each other; of a third member longitudinally fixed relatively to said work-holding member, said third member being formed with an eccentric extension longitudinally slidably held in said die-holding member; and a shaft journaled in said extension and geared to said work-holding member; said shaft being of reduced diameter intermediately between its ends and having a central passage for lubricant extending from its forward end and connected by radial passages with such reduced portion and with the bearing portion in front thereof, respectively.

6. In mechanism of the character described, the combination of a work-holding member; a sleeve rotatable, but not longitudinally movable, within said member; a die-holding member longitudinally movable within said sleeve but not rotatable relatively thereto; and a driving shaft carried by said sleeve and geared to said work-holding member, the outer bearing face of said sleeve being formed with an encircling groove and said work-holding member being formed with a lubricant containing chamber communicating with such groove.

7. In mechanism of the character described, the combination of a work-holding member; a sleeve rotatable, but not longitudinally movable, within said member; a die-holding member longitudinally movable within said sleeve but not rotatable relatively thereto; and a driving shaft carried by said sleeve and geared to said work-holding member, the outer bearing face of said sleeve being formed with an encircling groove and said work-holding member being formed with a lubricant containing chamber communicating with such groove, the bearing face of said member being longitudinally grooved at the point where such chamber opens therein.

Signed by me this 10th day of January, 1911.

LOUIS F. HART.

Attested by—
D. T. DAVIES,
ANNA L. GILL.